
मोटर साइकिल — अधिकतम गति
का मापन
(चौथा पुनरीक्षण)

Motorcycles — Measurement of
Maximum Speed
(Fourth Revision)

ICS 43.140

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FOREWORD

This Indian Standard (Fourth Revision) was adopted by the Bureau of Indian Standards, after the draft finalized by the Automotive Braking and Steering System, Vehicle Testing and Performance Evaluation Sectional Committee had been approved by the Transport Engineering Division Council.

This standard was first published in 1982 and was subsequently revised in 1993, 2002 and 2009. Third revision of this standard was identical with ISO 7117 : 1995 'Motorcycles – Measurement of maximum speed' issued by the International Organization for Standardization (ISO). Subsequently ISO 7117 has been revised in 2010.

In India, this standard will be also used for regulatory purposes. Most commonly followed document for maximum speed in India is the European Directive 95/1 EEC. The draft GTR for maximum speed is also based on this directive.

The major difference between ISO 7117 : 2010 and this directive are:

- a) Directive 95/1/EC has the administrative requirements for verification
- b) ISO 7117 prescribes more types of test tracks for measurement of maximum speed.

It is felt that the new types of test tracks prescribed in the ISO may not be needed in India. In any case till these are incorporated in the regulatory requirements, it will not be possible to use them for the export homologation process.

Hence this standard has been aligned with European Directive 95/1/EC.

In this standard SI units have been used, the unit of force, in Newton (N), of tyre load, in kilogram (kg) and of pressure, in Pascal (Pa). Their relationship are given below for information:

1 kgf	= 9.806 65 N (exactly)
	= 9.81 N (approximately)
	= 10 N (within 2 percent error)
1 kPa	= 0.01 kgf/cm ² (within 2 percent error)
1 kgf/cm ²	= 98.066 kPa

NOTE — Values of kPa rounded to the nearest practical unit.

For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS 2: 1960 'Rules for rounding off numerical values (*revised*)'. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

Indian Standard

MOTORCYCLES — MEASUREMENT OF MAXIMUM SPEED

(*Fourth Revision*)

1 SCOPE

1.1 This standard specifies the method of determining the maximum speed of a L2 category motorcycle, as defined in IS 14272.

1.2 L2 category vehicles of hybrid and battery operated vehicles are not covered in this standard.

2 REFERENCES

The following standards contain provisions, which through reference in this text, constitute provisions of this standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below:

<i>IS No.</i>	<i>Title</i>
11422 : 2001	Terms and definitions of weights of two wheeled motor vehicles
14272 : 2011	Automotive vehicles — Types — Terminology

3 TEST VEHICLE

3.1 The test vehicles used for propulsion unit performance tests shall be representative of the vehicle type with regard to the propulsion unit performance produced in series and placed on the market.

3.2 Preparation of the Test Vehicle

3.2.1 The test vehicle shall be clean and only those accessories needed to enable the vehicle to undergo the test shall be in operation.

3.2.2 The fuel-supply and the ignition settings, the viscosity of the lubricants for the mechanical parts in motion, and the tyre pressures shall be as required by the manufacturer.

3.2.3 The engine, drive train and tyres of the test vehicle shall have been properly run-in in accordance with the manufacturer's requirements.

3.2.4 Before the test, all parts of the test vehicle shall

be in a thermally stable state, at their normal operating temperature.

3.2.5 The test vehicle shall be submitted at its mass in kerb mass as defined in IS 11422.

3.2.6 The distribution of the loadings across the wheels of the test vehicle shall be as intended by the manufacturer.

4 DRIVER

4.1 The driver shall have a mass of $75 \text{ kg} \pm 5 \text{ kg}$ and be $1.75 \text{ m} \pm 0.05 \text{ m}$ tall.

4.2 The driver shall wear an adjusted one-piece suit or suitable item of clothing and appropriate helmet.

4.3 The driver shall be seated on the driver's seat with his feet on the pedals or footrest and his arms extended normally. Where vehicles achieve a maximum speed of more than 120 km/h when their rider is in a seated position, the rider shall be equipped and positioned as recommended by the manufacturer and shall be in full control of the vehicle throughout the test. The driving position shall be the same throughout the test and described or represented by photographs in the test report.

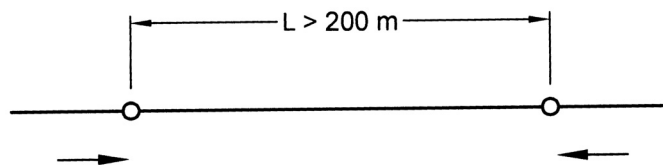
5 CHARACTERISTICS OF TEST TRACK

5.1 The tests shall be carried out on a road,

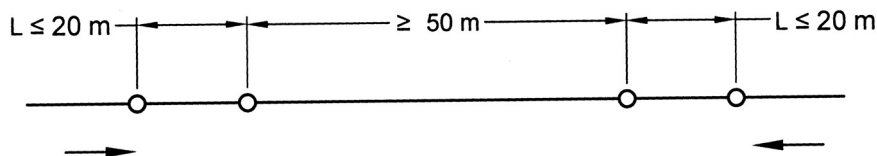
- a) which allows the maximum vehicle speed to be maintained along a measurement base as defined in point 5.2. The acceleration track preceding the measuring base shall be of the same type (surface and longitudinal profile) and be sufficiently long for the vehicle to reach its maximum speed;
- b) that is clean, smooth, dry and asphalted or surfaced in an equivalent manner; and
- c) having a longitudinal gradient of not more than 1 percent and a degree of banking of not more than 3 percent. The variation in altitude between any two points on the test base shall not exceed 1 m.

5.2 The possible configurations for the measuring base are illustrated in 5.2.1, 5.2.2 and 5.2.3.

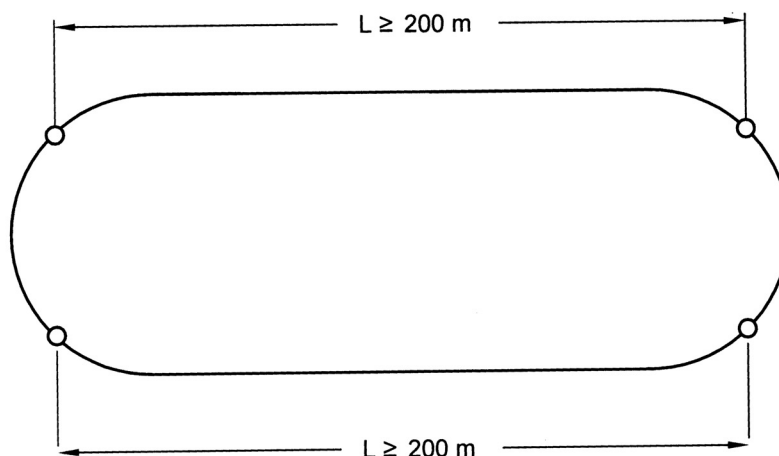
5.2.1 Type 1



5.2.2 Type 2



5.2.3 Type 3



5.2.3.1 The two measuring bases L shall be equal in length and virtually parallel to each other.

5.2.3.2 If both measuring bases are curvilinear in shape despite the requirements of **5.1.3**, the effects of centrifugal force shall be compensated for by the cross-section of the bends.

5.2.3.3 Instead of the two bases L (see **5.2.3.1**), the measuring base may coincide with the overall length of the annular test track. In this case, the minimum radius of the bends shall be 200 m and the effects of centrifugal force compensated for by the cross-section of the bends.

5.3 Length L of the measuring base shall be selected in conjunction with the accuracy of the equipment and the methods used to measure testing time t so that the value for actual vehicle speed shall be plotted to within ± 1 percent. If the measuring equipment is of the manual type, length L of the measuring base shall not be less than 500 m. If a Type 2 measuring base has been selected, electronic measuring equipment shall be used in order to determine time t .

6 ATMOSPHERIC CONDITIONS

6.1 Atmospheric conditions shall be as follows:

- a) Atmospheric pressure: 97 ± 10 kPa.

- b) Ambient temperature range: 278.2 K to 318.2 K (5°C to 45°C).
- c) Relative humidity range: 30 percent to 90 percent
- d) Average wind speed, measured 1 m above the ground: < 3 m/s, permitting gusts of < 5 m/s.

7 TEST PROCEDURES

7.1 The gear ratio used during the test shall be that enabling the vehicle to reach its maximum speed on level ground. The throttle control must be kept fully open and the enrichment devices must be inoperative.

7.2 Driver of the test vehicles shall maintain his driving position as defined in **4.3**.

7.3 The vehicle shall arrive at the measuring base at a constant vehicle speed. Type 1 and Type 2 bases shall be travelled along in both directions in succession.

7.3.1 Testing in a single direction may be accepted on a Type 2 measuring base if, owing to the characteristics of the circuit, it is not possible to reach the maximum speed of the vehicle in both directions. In this case:

7.3.1.1 The test run shall be repeated five times in immediate succession.

7.3.1.2 The speed of the axial wind component shall not exceed 1 m/s.

7.4 Both bases L on a Type 3 measuring base shall be travelled along consecutively in a single direction, without interruption.

7.4.1 If the measuring base coincides with the total length of the circuit, it shall be travelled along in a single direction at least twice. The difference between the extremes of the time measurements shall not exceed 3 percent.

7.5 The fuel and lubricant shall be those recommended by the manufacturer.

7.6 The total time t needed to travel along the measuring base in both directions shall be determined to an accuracy of 0.7 percent.

7.7 Determination of Average Speed

Average speed v (km/h) for the test is determined as follows:

7.7.1 Type 1 and Type 2 measuring base

$$v = \frac{3.6 \times 2 \times L}{t} = \frac{7.2 \times L}{t}$$

where

- L = length of measuring base (m), and
- t = time (s) taken to travel along measuring base L (m).

7.7.2 Type 2 measuring base, travelled along in a single direction

$$v = v_a$$

where

v_a = vehicle speed measured for each test run (km/h)

$$v = \frac{3.6 \times L}{t}$$

where

- L = length of measuring base (m), and
- t = time (s) taken to travel along measuring base L (m).

7.7.3 Type 3 measuring base

7.7.3.1 Measuring base consisting of two parts L (see 5.2.3.1)

$$v = \frac{3.6 \times 2 \times L}{t} = \frac{7.2 \times L}{t}$$

where

- L = length of measuring base (m); and
- t = total time (s) needed to travel along both measuring bases L (m).

7.7.3.2 Measuring base coinciding with the total length of the annular test track (see 5.2.3.3)

$$v = v_a \cdot k$$

where

$$v_a = \text{vehicle speed measured (km/h)} \quad v = \frac{3.6 \times L}{t}$$

where

- L = length of trajectory actually followed on the annular speed-test track (m), and
- t = time (s) needed to complete a full lap

$$t = \frac{1}{n} \cdot \sum_{i=1}^n t_i$$

where

- n = number of laps,
- t_i = time (s) needed to complete each lap, and
- k = correction factor ($1.00 \leq 1.05$); this factor is specific to the annular test track used and is determined experimentally in line with Annex A.

7.8 The average speed shall be measured at least twice in succession.

8 VEHICLE MAXIMUM SPEED

The maximum speed of the test vehicle shall be expressed in kilometres per hour (km/h) by the figure corresponding to the closest whole number to the arithmetical mean of the values for the vehicle speeds measured during the two consecutive tests, which shall not diverge by more than 3 percent. When this arithmetical mean lies exactly between two whole numbers it is rounded up to the next highest number.

9 INTERPRETATION OF THE RESULTS

9.1 If the verification is done for the purpose of statutory compliance, the following shall apply.

9.2 The vehicle maximum speed, determined as per 8 shall not differ by ± 5 percent of the value declared by the manufacturer.

9.3 If the measured value differs from the declared value by more than the limits prescribed above, at manufacturer's option

- a) The measured value be considered declared value or
- b) The manufacturer may declare a new value which satisfies the requirements of 9.2.

9.4 The application for type-approval in respect of the maximum design speed of a vehicle shall contain the information set out as follows in Annex B.

9.5 Every functional modification in technical specifications pertaining to maximum speed declared in accordance with 9.2 shall be intimated to the testing agency.

- 9.6 Testing agency may then consider, whether,
- the test result recorded already is valid for vehicle with modification(s).
 - any testing is required.

9.7 For considering whether testing is required or not, guidelines given in Annex C shall be followed.

Changes other than those listed above, are considered to be having no adverse effect on measurement of vehicle maximum speed.

ANNEX A

(Clause 7.7.3.2)

PROCEDURE FOR DEFINING THE CORRECTION COEFFICIENT FOR THE ANNULAR TEST TRACK

A-1 Coefficient k relating to the annular test track must be plotted up to the maximum permitted speed.

A-2 Coefficient k must be plotted for several speeds in such a way that the difference between two consecutive speeds will not be more than 30 km/h.

A-3 For each speed selected the test must be carried out in line with the requirements of this Directive, in two possible ways:

- Speed measured in a straight line V_d .
- Speed measured on the annular test track V_a .

A-4 For each speed measured values V_a and V_d are entered on a diagram (Fig. 1) and the successive points linked by means of a segment of a straight line.

A-5 The coefficient k is given by the following formula for each speed measured:

$$k = V_d / V_a$$

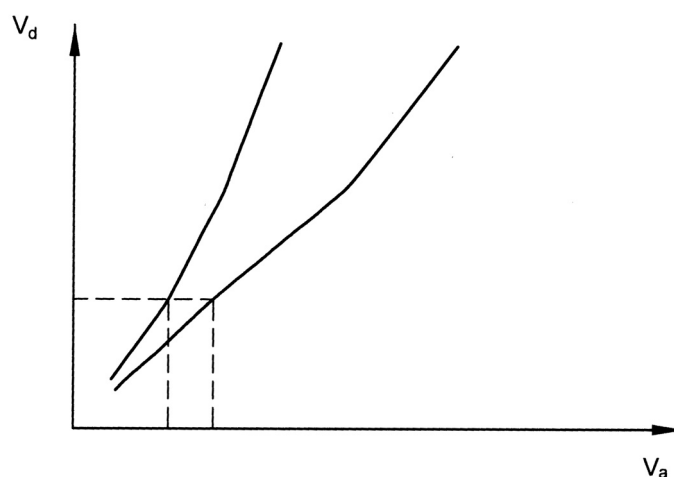


FIG.1 PLOTTING OF V_a AND V_d

ANNEX B

(Clause 9.4)

INFORMATION TO BE GIVEN FOR TYPE APPROVAL**B-1** Commercial name of the model**B-2** Type (state any possible variants and versions: each variant and each version may be identified by a code consisting of numbers or a combination of letters and numbers)**B-3** Vehicle category**B-4** Name and address of manufacturer**B-5** Name and address of manufacturer's authorized representative, if any:**B-6** Kerb weight, kg**B-6.1** Distribution of that mass between the axles, kg**B-7** Reference mass, kg**B-7.1** Distribution of that weight between the axles, kg**B-8** Manufacturer**B-9** Engine Make**B-9.1** Type (stated on the engine, or other means of identification)**B-10** Diagram of transmission system**B-11** Type (mechanical, hydraulic, electrical ,etc)**B-12** Clutch (type)**B-13** Gearbox**B-13.1** Type: automatic /manual**B-13.2** Method of selection: by hand/foot**B-14** Gear ratios

N	R_1	R_2	R_3	R_t
Minimum continuously variable transmission				
1				
2				
3				
Maximum continuously variable transmission				
N = gear ratio R_1 = primary ratio (ratio of engine speed to rotational speed of primary gearbox shaft) R_2 = secondary ratio (ratio of rotational speed of primary shaft to rotational speed of secondary shaft in gearbox). R_3 = final drive ratio (ratio of rotational speed of gearbox output shaft to rotational speed of driven wheels). R_t = overall ratio.				

B-15 Maximum speed of vehicle and gear in which it is reached (km/h)**B-16** Tyres (category, dimensions and maximum loading) and rims (standard type)**B-16.1** Tyre pressures recommended by the manufacturer: kPa

ANNEX C

(Clause 9.7)

GUIDELINES FOR SELECTION OF REPRESENTATIVE VEHICLE AND
CRITERIA FOR EXTENSION OF TYPE APPROVAL

C-1 This Annex gives parameters to be considered while selecting a vehicle to represent a range or variants and versions for testing the vehicle for type approval as per this standard. This is also used for the extension of type approval certificate of one model to changes in technical specifications, or to its variant(s) and version(s).

C-2 In general, when changes in technical specifications of vehicle do not affect the measurement

of maximum speed, the type approval certificate shall be extended without any testing.

The changes in parameters that affect measurement of maximum speed are listed in **C-3**.

C-3 In the case of following changes, Type Approval shall be extended if changes are within the prescribed limits, else testing is necessary for establishing compliance:

<i>Sl No.</i>	<i>Parameter</i>	<i>Criteria for Type Approval Extension (NO TEST)</i>
i)	Engine power	Test required if the power is increased/reduced in excess of 5 percent
ii)	Kerb mass of the vehicle	Test required if Kerb mass is decreased/increased more than 10 percent
iii)	Tyres, transmission ratio etc	$E = (V_2 - V_1)/V_1$ where at engine speed of 1 000 rev/min at the gear in which the maximum speed is attained, V_1 is the speed of the vehicle model type approved and V_2 is the speed of the vehicle model for which extension of the approval is requested To be tested if $E > \pm 8$ percent
iv)	Fuel	To be tested in any change
v)	Flexi fuel	To be tested in case of e5 fuel.
vi)	Gear in which maximum speed is achieved	As per serial No. (iii) of this table.

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Amendments Issued Since Publication

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